

## **“Tribal Garden”**

### **Schitsu’umsh Relationships with Their Dynamic Landscapes: Identifying, Managing and Applying Indigenous Knowledge and Praxis Deliverable #4**

**Intentions:** Based upon the research developed in association with the Sqigwts NKN Climate Change project, this document provides recommendations on how to design inter-actable food producing “Gardens” (the term defined later in this document), with appropriate Indigenous content and pedagogical considerations relating to climate change. The Garden could be used by the Tribe at their discretion to identify, protect and perpetuate the use and locations of traditional, native plants used in the traditional seasonal round. It seeks to demonstrate that both indigenous and scientific knowledge can be successfully applied in this endeavor. It seeks to be an educational venue for students and their teachers, and to be a sustainable garden, potentially producing healthy food resources for families in the community. And finally, it seeks to plan a garden that is adaptable in the face of projected climate change.

**Note:** No specific locations of traditional plants, nor their associated cultural practices, will be identified or disclosed to the public without the consent of the Coeur d’Alene Tribe.

#### **Defining and designing “Tribal Gardens” in the landscape, as it relates to traditional plant use along with western tradition of gardening, to provide Scientific Research to Address Climate Change**

The following proposal is a tentative outline of what could be developed. Further discussion and input by the Sqigwts NKN collaborative team (tribal and university personnel) would be recommended.

The four key objectives are:

- 1.** Increase indigenous knowledge and access to species of indigenous plants with cultural significance, through establishment of: locations, identification, use, harvest and protection of TEK determined sacred plants. See pages 2 – 3.
- 2.** Through currently developing scientific theory and methodology design an ecological system or “Garden Guild” based in the ideas of permaculture, sustainability and microclimate establishment that produces abundant fresh produce for tribal community members. See pages 3 – 4.
- 3.** Relating both the Indigenous knowledge of native plants in their natural locations, and community members’ interactions with the Garden Guild, to the study of climate change provides opportunities to conduct research about, increase understanding, and effectively mitigate the influences of climate change on the Palouse and traditional Schitsu’umsh homelands. See pages 5 – 7.
- 4.** Implement oral traditions of passing down experiential knowledge to future generations through opportunities for experiential education, acknowledging various methods of knowing including oral tradition, scientific inquiry, and hands on experience. See pages 7 – 9.

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**OBJECTIVE 1. Define traditional and culturally significant plants used historically and currently to protect, expand and increase access of tribal members.**

Due to the sensitive nature of culturally significant knowledge and use of traditional foods such as Sqigwts or Camas Root, research related to location, use, harvest, significance, and all other unidentified and related information will be limited to approved personnel.

**Defining “Garden” as it applies to Sqigwts NKN Climate Project.** The word “garden” is of European origin, and signifies an enclosure of a natural space, or residential yard (Webster). This construct of delineating boundaries around a space meant for food production did not exist among the Schitsu’umsh in pre-contact times. The idea of a garden, brought to this continent with Western settlement, has evolved over the last few hundred years to its current state, representing a location where plant species are purposefully propagated for harvest or enjoyment, generally on a small horticultural scale. It would be inappropriate to apply this western construct to unbounded, naturally occurring gifts of food from the creator. But to say that Schitsu’umsh did not engage with the propagation of plants is not entirely true, as some accounts from the past relate that the tribe engages in burning fields to increase yields and keep meadows clear for Camas Roots, along with the seeding of potentially productive areas (Deur and Turner 2005). Native plants are *chnisteemilqwes* – “I am your relative,” and as gifts from the creator are not to be disrespected by transplanting and assisted propagation in a conventional garden. Thus the phrase “Native Garden,” is used to identify a naturally occurring native species of food plants, and is used in this document for lack of a better term. “Native Garden” designates a conceptual body of gifts of Sqigwts or other traditional plants, including their locations, and surrounding ecology (not entirely location based, nor bounded with fences, hedges, or property markers, but rather as the entirety of gifts given by the creator for the people). It is left to the discretion of tribal elders to determine to what extent native species are propagated, planted, seeded or transplanted.

Considerations of the conceptual “Native Garden” include: 1 Increase knowledge of location and use of traditional plants for the purpose of benefiting the Tribe. 2 Increase Tribal access to traditional locations for gathering traditional plants. 3 Protecting traditional plants and gathering locations, including potential reintroduction of species to historic gathering areas. Many locations for gathering traditional plants remain sacred to tribal members, but have been greatly reduced or eliminated through farming, logging, mining, or other ground disturbing activities over the last century.

**Consideration 1. Identifying culturally significant “Gifts” (plants) and traditional locations of gathering.**

Assessment of known locations to provide written evidence of current and historic locations for gathering, to be done through interviewing of tribal members. Plant that are significant, once identified, can be protected from wholesale destruction and removal. Where appropriate increase range and or reintroduction could be done to increase tribal access harvesting. The scope of this research could be far reaching, encompassing the knowledge of all the significant plants to the Schitsu’umsh and the landscapes which they come from (Frey Pers. Comm. 2015).

To convey the meaning and significance of Indigenous plant use in the context of climate change, historic ranges can be used to show the loss of habitat and in turn loss of access by tribal members to specific plants. This could be demonstrated through the use of USGS ArcMap.

**Consideration 2. Increase tribal access to traditional gathering locations.** Many traditional locations of gathering plants are currently on private land. Along with identification of these locations, the partners of the project may work for increased permission from landowners and agencies for tribal members to participate in collection and seasonal round activities (Frey pers. comm. 2015). Mutual empathy, *snukwnkhwtshwts'mi'ls*, may be developed by educating landholders about tribal history and significant species, supporting future relations that could result in greater access to traditional lands.

**Consideration 3. Protecting traditional plants and gathering locations, including potential reintroduction of species to historic gathering areas.** Destructive alterations of the landscape such as logging, mining and tilling the soil for commercial farms removes native plants from the landscape. Areas that were once rich with Camas and other roots have been turned into landscapes void of native plant life. Locations that still host a diversity of natural species are becoming fewer in number, and many are inaccessible to tribal members for traditional seasonal round gathering. In many instances pesticides are sprayed on crops to destroy all weeds (including native species) that are not tolerant of the toxic chemicals. This treatment of the land is in line with the current agricultural model practiced in the United States, and is a major threat to native species of plants (Hemenway 2001). Identification and protection of any remaining natural landscapes is a top priority to preserve the Traditional Ecological Knowledge remaining with the tribe. Where it's possible, the reintroduction of native species would benefit the tribe by increasing opportunities for seasonal round gathering of plants. Preservation of these types of landscapes is necessary for the preservation of Tribal Cultural Property Rights, TEK and to preserve the natural ecology of the region.

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**OBJECTIVE 2. Design an ecological system or “Garden Guild” based in the ideas of permaculture, sustainability and microclimate establishment that produces abundant fresh produce for tribal community members.**

At the request of Tribal Council Members one of the objectives of this project is, with tribal members' help, to design a sustainable cultivated garden, hereafter referred to as “Garden Guild” (See Appendix A). The primary purpose of the Garden Guild would be to provide healthy, fresh produce to members of the community with very little maintenance. It has come to the attention of members of the project that tribal gardens are already being maintained by the tribe through federal grant funding. The Garden Guild proposed in this section is not to supplant or replace these existing tribal gardens but rather supplement what is already in place. There are drastic differences in the design and operation of the Garden Guild as compared to the gardens the tribe currently operates that are explained further in this document.

Considerations of the design and development of the Garden Guild include: 1 Design a system that incorporates abundant healthy, edible plants that are accessible to community members. 2 Reduce maintenance and labor associated with keeping the Garden Guild productive. 3 Avoid the use of conventional agricultural practices such as soil tilling and furrowing, use of pesticides, and use of chemical fertilizers. Current conventional agricultural methods practiced in the United States are descended from methods brought from Europe. Driven by production optimization and profits, much of current agriculture has moved away from the methods of nature.

**Consideration 1. Design a Garden Guild that incorporates abundant healthy edible plants that are accessible to tribal members.** The Garden Guild is a location based, intentionally modified environment that includes symbiotic plant relationships to create an ecologically designed space for the purpose of

growing and harvesting plants (Hemenway 2009). The design of the Garden Guild would be located in a place where it can be accessible to all members of the community. An area near the Wellness center in Plummer Idaho has been proposed as a potential location. Plants that will be included in the Garden Guild would include annuals such as carrots, peas, corn, tomatoes and other common garden vegetables, but the design is not limited to only annuals but would also include many perennials that act as support to the Garden Guild's ecological system. Native species can and should be an important part of the Garden Guild's design, allowing tribal members the opportunity to interact with these species on a regular basis by harvesting and using them in rituals, and providing opportunities to educate younger members of the tribe.

**Consideration 2. Reduce maintenance and labor associated with keeping the Garden Guild productive.**

In current gardening philosophy plants generally only serve one purpose. Tomato plants grow tomatoes, which are harvested and when the tomatoes are gone the plant is ripped from the soil. Ecologically designed Garden Guilds recognize that plants perform more than one function and those functions can be utilized to support a garden that is healthy, requires no weeding or pesticides, and is fertilized naturally. This type of garden reflects in many ways the tribal philosophy of living in harmony with nature or - *unshat'qn* – “eye-to-eye.” We are all equal to one another, human, plant, animal, fish peoples. . . . None are better than another. In a Garden Guild plants are not bound in raised beds, forced to grow with chemicals while all other species are killed to reduce competition. Rather, Garden Guilds are modified natural landscapes where a plant's natural functions support the entire ecological system. One example of such a symbiotic relationship would be a plant which has roots that reach deep into the earth to draw out minerals. In the fall its mineral rich leaves fall to the ground and decomposes, nourishing the nearby plants with shallower roots systems. This type of relationship between plants exists throughout the natural world, and with care and design is one component of a Garden Guild. Many other principles of ecological design must be incorporated (which are not fully discussed in this document) into the Garden Guild to successfully be sustainable and grow the fruits vegetable and herbs that are needed.

**Consideration 3. Avoid the use of conventional agricultural practices such as soil tilling and furrowing, use of pesticides, and chemical fertilizers.** Current agriculture methods use tilling the soil to suppress weeds and stimulate microbial action to produce a quick release of nutrients. These nutrients are quickly used up by crops in a few seasons, leaving soils depleted of nutrients. To solve this dilemma synthetic chemical stimulants are used to replenish missing nutrients, creating unnatural, experimental (Hemenway 2009).

As the soil is ripped up and turned over, leaving a wound of unprotected earth, fast growing weeds immediately begin growing to stabilize the soil, hold moisture and create environments where other plants will grow (Hemenway 2009). Consider a newly bulldozed forest hill side. Within one season the hill is covered in fast growing, hardy weeds such as Mullin, thistles, cheat grass, and milk weed. Within five years the same hill side will have shrubs and bushes established, creating pockets of moisture in the soil and shade where seedling trees can survive the summer sun. Within another five years that same hill side will be speckled with juvenile trees on their way to reforming the mature forest landscape, healing the wound of bulldozed earth. As modern American gardeners till soil and make rows of furrows they are fighting weeds that are naturally attempting to heal the open wound created by the plow. This is type of gardening is in opposition to natural processes and makes gardens that are unhealthy and that require large amounts of pesticides or hours upon hours of weeding to maintain (Hemenway 2009).

Wouldn't it be great to have a garden that produces abundance without tearing up the soil and then laboring to keep it weed free? Ecological design correctly applied in the context of a Garden Guild offers this type of solution, creating a natural-feeling landscape that maintains desirable plant life through symbiotic relationships, and promotes food producing plants by naturally "weeding out" unwanted varieties.

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**OBJECTIVE 3. Relating both the Indigenous knowledge of native plants in their natural locations, and community members' interactions with the Garden Guild, to the study of climate change provides opportunities to conduct research about, increase understanding, and effectively mitigate the influences of climate change on the Palouse and traditional Schitsu'umsh homelands.**

Both the Native Garden and Garden Guild would be the focus of this ongoing project component. Considerations relating to the study of climate change in the context of a Tribal Garden include: 1. A dual scientific and Indigenous approach to understanding the relationship of humans with plants of the Palouse and reservation areas, recognizing that Indigenous knowledge of the local environment encompasses thousands of years of experience in that landscape. 2. Long-term observation of changes in both the Native Garden landscapes and the Garden Guild, in order to understand the impact of climate change on the Palouse and Schitsu'umsh traditional homelands, and adapt to it. 3. Mitigating the effects of climate change through sustainable methods of food production and native environmental preservation. Recognizing the Schitsu'umsh capacity for adaptation to changing circumstances, in order to perpetuate their culture and ways of life, is essential to implementing effective policies for future ecological sustainability. The opportunity to study climate change through conceptual Native Gardens and Garden Guilds facilitates a perspective where *hnkhwelkhwlnet*-Traditional Ecological Knowledge and western science have equal value, and may help mitigate any challenges that climate change presents in the region.

**Consideration 1. A dual scientific and Indigenous approach to understanding the relationship of humans with plants of the Palouse, recognizing that Indigenous knowledge of the local environment encompasses thousands of years of experience in that landscape.** Schitsu'umsh oral tradition has passed on knowledge from the time of Chief Child of the Yellow Root to the present. That knowledge helped perpetuate a culture that thrived in-place for time immemorial. Conversely, disturbance of and extensive damage to Western North American landscape developed at an increasing rate after European exploration and subsequent settlement. The traditional homelands of the Schitsu'umsh began to be tilled and planted with wheat and other commodity crops. *Hnkhwelkhwlnet*-Traditional Ecological Knowledge of the Schitsu'umsh has to a great extent been supplanted by commercial farming, which in turn has driven landscape policy.

Acknowledging Indigenous knowledge as equal to, and as relevant as, scientific knowledge provides the opportunity to develop better food and environmental policy. This is especially important when making long-term decisions related to climate change. Thousands of years of Indigenous ecological knowledge cannot be ignored on the presumption that it is not based in observation of natural phenomenon. Oral traditions are as valuable and valid for their ability to preserve and communicate through time and generations (Frey pers. comm. 2015). Knowledge of individual plants, locations, ecosystems, and natural cycles is indispensable to understanding the effects of climate on the tribal area.

**Consideration 2. Long-term observation of changes in both the “Native Garden” landscape and the “Garden Guild,” in order to understand the impact of climate change on the Palouse and traditional homeland, and adapt to it.** The two proposed gardens bring together a scientific understanding of climate change with plant food cultivation, and Indigenous knowledge of a specific landscape and the traditional foods that grow therein. The Schitsu’umsh have long utilized *snukwnkhwtskhwts’mi’ls ł stsee’nidmsh*, “empathic adaptability,” to deal with challenges of the landscape and Euro-American forced acculturation, as discussed in Deliverable #2. Empathic adaptability is the value that facilitates the coming together of scientific and Indigenous knowledge in the garden context. An adaptive model allows for the anticipation of and timely response to changing environmental conditions and such climate change-related threats as extreme weather events (flooding or drought, for example).

Scientific knowledge tells us that climate change results in changing patterns of weather, moisture, and temperature, which in turn affect whether plants thrive. The Garden Guild is designed using long-term and place based principles, combined with protecting access to “Native Garden” areas where indigenous, culturally significant plants have traditionally thrived. Long-term observation in these contexts can potentially provide insight to how effects of climate change manifest in the environment, and how to effectively adapt to them. By locating the Garden Guild in their traditional landscape, the Tribe can use their Indigenous knowledge that stretches back thousands of years to inform scientific interpretation of the changes observed. With their *hnkhwelkhwlnet*-TEK and *snukwnkhwtskhwts’mi’ls ł stsee’nidmsh*, empathic adaptability, the Schitsu’umsh will be able to adjust the structure and plan of the garden to be resilient and sustainable in the face of climate change.

The traditional knowledge of the Schitsu’umsh provides insight into the long-term ecological patterns of the area. Combined with the observations made in the Tribal Garden, these perspectives offer insight into how the landscape has been altered over time, and might continue to change. Both component gardens offer opportunities to observe the effects of climate change on plants in their natural environment and in a designed environment.

**Consideration 3. Mitigating the effects of climate change through sustainable methods of food production and native environmental preservation.** As discussed earlier, the Schitsu’umsh embody the cultural trait of *snukwnkhwtskhwts’mi’ls ł stsee’nidmsh* “empathic adaption,” combining multiple ways of doing and understanding in their *hnkhwelkhwlnet*, “ways of life in the world.” The Schitsu’umsh have the capacity to participate in traditional gathering from their Native Garden, while simultaneously designing and harvesting from the Garden Guild, demonstrating how the effects of climate change might be mitigated through the practice of gathering and small-scale food production. Such an approach might benefit the community for years to come.

As much as 80% of current land use in America supports urban areas, thus reducing natural landscapes to prioritize commercialized farming, logging and mining operations. Combine the negative effects of these practices with climate change, and the possibility for communities to have access to healthy, nontoxic foods without destroying the surrounding ecology seems bleak (Hemenway 2009). The future effects of climate change are not completely known, but the possibilities of ecological disaster are real and should be mitigated as best as possible through alternative approaches to food procurement.

Suggested strategies for dealing with increasingly unpredictable or inconsistent weather patterns are included in the conceptual garden plan, including soil care that facilitates high organic matter, planting a diversity of hearty heirloom varieties, rain-water collection, etc. (Wolf, et al. 2014) The approach of

permaculture is valuable because garden systems that are high in diversity are more resilient to changes in environment because they are more likely to “go through natural stages of succession, adapting in ways that prevent whole agroecosystem collapse” (Bowen 2007). See Appendix B for more discussion.

Tribal knowledge of the environment is based on thousands of years of observation, passed down through oral tradition. Climate change on the Palouse can be better understood and predicted by accessing historical climate knowledge through the oral tradition. A combination of current modern science modeling along with knowledge of the past, contained in TEK of tribal members can work symbiotically to give scientists and researchers an advantage. Scientists that will treat TEK with the same value and validity as knowledge reached through the scientific method will be better equipped for the challenge of adapting to the effects of the changing climate (Frey pers. comm. 2015).

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**OBJECTIVE 4. Implement oral traditions of passing down experiential knowledge to future generations through opportunities for experiential education, acknowledging various methods of knowing including oral tradition, scientific inquiry, and hands on experience.**

The Schitsu’umsh have an oral tradition of passing knowledge from elders to the youth of the Tribe. In this way they have propagated their culture and practices since time immemorial. This oral tradition has always been place-based, and teaches the Schitsu’umsh to live in-place. The *mi’yp* “teachings from all things,” and way of life, *hnkhwelkhwlnet*, are embedded in the landscape. A Tribal Garden that integrates multiple locations, and native and cultivated plants, might integrate this oral tradition itself into the plan and implementation of the garden, and allow for opportunities to educate children in traditional *mi’yp*, scientific fundamentals of sustainable food production, and the effects of climate change on the Palouse and the traditional homelands of the Schitsu’umsh.

Considerations for developing the educational potential of both the “Garden Guild” and “Native Garden” include: 1. integrating types of knowledge to provide opportunities for experiential learning in traditional foods and sustainable gardening, and the *mi’yp* embedded in the landscape of the Schitsu’umsh. 2. Utilizing the setting of the gardens to educate children about the science of climate change, its effects, and how to respond to it.

**Consideration 1. Integrating types of knowledge to provide opportunities for experiential learning in both traditional foods and sustainable gardening as described in Deliverable Number Five, and the *mi’yp* embedded in the landscape of the Schitsu’umsh.** Both components of the proposed garden – Native Garden and Garden Guild – might facilitate place-based, experiential learning. Children may spend time interacting with and learning to know plants and other life in the garden as well as the landscape in which the garden spaces are located. Rather than relying on the book-oriented, classroom style learning that is so emphasized in American schools and literacy, this project could instead maintain a pedagogical focus on interactions that build relationships between children and the subject of learning. This is in keeping with *chnisteemilqwes*, the teaching that we are all related.

Left to the Tribes discretion the Native Garden may include cultivation of traditional foods but focuses on the protection of and access to land on which those gifts grow. Lands that are protected for traditional uses provide a setting in which to engage in the traditional oral and experiential ways of

teaching children both how to properly engage in the procurement of these gifts, such as camas and the water potato, and how to understand the *mi'yp* embedded in the landscape in which these gifts grow.

The Garden Guild may function to integrate orality in the scientifically based cultivation of introduced plant foods. Educational garden programs around the country have been very successful in expanding learning opportunities in contexts outside of the written-knowledge context of the classroom (Lieberman and Hoody 1998). Of course, the Schitsu'umsh have been successful in this for thousands of years. Developing a permanent garden space provides the opportunity to teach children about sustainable gardening and food production, healthy eating, physical activity and more, all in the context of the landscape their people have lived in for ages.

Utilizing the surrounding environment as a learning context has the benefit of increasing children's skills and abilities in other fields, as well as providing them opportunities to develop stronger self-esteem and interpersonal skills (Lieberman and Hoody 1998). One of the goals of the proposed garden project is to provide food for those who are in need. When youth invest themselves in a project that will provide for others, they learn to be generous. They learn to understand the value of compassion, *snukwnkhwtshwts'mi'ls*, caring for others.

A garden with ecological design can help children see how each plant, insect, and other forms of life have an important role to play in supporting the garden as a whole. Delving into the relationships among the plants and other life forms, seeing their value to each other and the whole, connects to and supports *unshat'qn*, the understanding that as living things we are all equal to one another. Even if the plants aren't all grown for food, they have a purpose and value in their landscape.

Engaging in the act of growing and/or harvesting one's own food can have powerful impacts on children's lives. Teaching them about where and how their food grows puts that food into a context that necessitates understanding the relationship between oneself and the plant, and the landscape in which the plant grows. This relationship may serve to support an understanding of and connection to *snqhepi'wes*, acknowledging and respecting the spirit that is imbued in all things.

**Consideration 2. Utilizing the setting of the gardens to educate children about the science of climate change, its effects, and how to respond to it.** As discussed in Objective 3, the Tribal Garden may provide a context in which to study and respond to the effects of climate change on the Palouse. This purpose can be strongly integrated with the educational component of the Tribal Garden. Children and youth who spend time in the garden throughout their education will be privy to the changes that occur within it, both as natural ecological responses to climate change, and the mitigating, adaptive adjustments made within the garden by humans. This proximity provides students with the opportunity to observe and understand climate change in the context of the garden, and to expand that knowledge to the Palouse at large.

As children begin to understand their relationship with the landscape, the place where their food grows, they can also be taught to make connections between the actions of Euro-American and other societies throughout the last few hundred years, and the effects of climate change we are now beginning to see. Children who have a deep understanding of the value and interrelatedness of all lives will also understand that we cannot continue to act in a way that is so damaging if we truly respect the value and spirituality of all things. They can learn and implement *snukwnkhwtshwts'mi'ls*, empathy (See Deliverable #2 more in depth discussion of *snukwnkhwtshwts'mi'ls*).



The lessons of the garden project are thus twofold: first, an experiential understanding of the *mi'yp* embedded in the same landscape as the garden and second, a firsthand perspective of the effects of climate change on the world they live in.

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## Appendix A

The term "Garden Guild" was coined by Permaculturist Toby Hemenway in his research and in his book "Gaia's Garden". The concept of the Garden Guild has been in development over the last few decades as a branch off of the more commonly known permaculture movement. Both concepts are a reaction in opposition to the American agriculture system that has become globalized, commodifying the relationship between people and food. Industrialization has contributed to the commodification of food, which has sent ripples through modern human existence. Many destructive effects of turning food into a commodity are just beginning to be felt as our relationship to our food becomes more distant, packaged, and sanitized. Reliance on grocery stores and shipping is at an all-time high, while traditional knowledge of food cultivation, harvest, preservation, and responsible consumption dwindles and becomes a thing of the past (Carolyn Steel 2009).

The Garden Guild is not simple fix to the problem of accessibility to wholesome food for a growing world population, but reflects a complexity that only nature could produce. Typical American gardens tend to be static, boxed, with boundaries, and fences, where the only things that grow are intentionally planted in furrowed soil, isolated from the rest of the natural world, and sprayed with pesticides and chemical fertilizers. The Garden Guild, conversely, is more akin to nature's way; diverse plants and animal species make up an ecosystem that with the right design is highly productive in healthy foods.

The success of Garden Guilds is based in the "interaction of organisms within the ecosystem (Hemenway 2001)." Naturally occurring plants exist in ecosystems where they interact with other plants and animals. The isolation of plants in a typical garden or in large scale agriculture is unnatural in its very foundation. Growing massive tracts of crops in isolation does not create healthy, diverse ecosystems, but rather ecosystems that can't be described as systems at all unless the system is "chemically based food production". Natural ecosystems are inherently resilient, relying heavily on their diversity and interactions between organisms for support and survival. In the Garden Guild the "designer" works with nature, not against it, to weave a resilient web of fertile soil, beneficial insects and animals with each organism tied to many others (Hemenway 2001).

Each organism in an ecosystem is interconnected with the organisms around it. This principle has been understood by the Schitsu'umsh for millennia as they have maintained the principle of *unshat'an*, meaning all things are equal and have a place. In conventional gardening weeds are the bane of the gardener's existence and must be pulled, burned or poisoned out of the garden so the desirable vegetables will have a place to grow. The conventional gardener questions "why do these weeds grow where I want vegetables, how can I get rid of these pests?" The reality is that the weeds are not the problem but rather, the problem is the entire philosophy employed by the gardener. In a typical garden the gardener prepares the soil by tilling it. Tilling kills the existing plants and makes the biomaterial in the soil explode with activity making a hyper rich environment for new plant growth. Weeds, the Band-Aids of nature, are the first to capitalize on the nutrient rich soil and begin the process of returning the landscape back to its former state. Every time a typical gardener looks back at the end of a hard day of tilling soil with pride in its eyes at a job well done, the ground torn open revealing the rich brown soil, the smell of the harvest to come, rather than pride the gardener should feel the weight of hours of future work pulling weeds, or the fear of chemical toxins seeping into the flesh of vegetables and poisoning water tables. The first step in eco-design is to recognize that conventional methods are unsustainable and destructive, because they must be sustained by the use of synthetic chemicals that are unhealthy for the environment and ultimately ourselves (Hemenway 2001).

**Appendix B**

Soils managed without using institutional, monoculture agricultural practices are more resilient to weather extremes (Niggli, Schmid, & Fliessbach). They exist as part of a system that acts as a carbon sink, capturing carbon from the atmosphere in the plants and soil, much less of which is released than in a garden system where everything is ripped out and removed on a yearly basis (Hepperly).

Insects and “pests” also respond to climate change at the local level, by mating and hatching at different times of the year, increasing population levels, and spreading out over broader ranges (Wolf, et al). Permaculture mitigates these challenges by creating systems that are high in biodiversity (Niggli, Schmid, & Fliessbach). “Weeds” and invasive species might respond similarly to climate change, with heat-hardy varieties moving into more areas and competing with native and introduced varieties of plants (Wolf, et al). By avoiding tilling and leaving soil bare, permaculture reduces the likelihood of weeds establishing a firm hold in the conceptual garden adding to its long term stability and productivity.